ESA-031 Goodyear Public Release Report

Introduction:

This Energy Savings Assessment was conducted at the Goodyear Tire and Rubber facility in Union City, TN. The Goodyear plant employs about 2,400 workers and manufactures radial passenger, light truck, and "p-metric" tires, which offer lighter weight, lower rolling resistance, and less aggressive tread designs than typical heavy-duty tires.

The steam production facility consists of 4 dual fueled (natural gas and #6 fuel oil) boilers and associated auxiliary equipment. Average annual steam demand is approximately 90 kLb/hr. Historically, the fuel mix has been approximately 60% #6 fuel oil and 40% natural gas.

Objective of ESA:

The objective of the ESA was to identify potential energy savings opportunities while training facility personnel in the use of the DOE Steam Tools Suite.

Focus of Assessment:

The assessment was focused on steam generation, distribution and end-use.

Approach for ESA:

Recent historical energy demand patterns and costs were examined along with expected current-year operation to establish a base-line profile to which any potential savings projects are compared.

Boiler efficiencies were determined with installed and portable instrumentation.

As combined fuel use will likely continue in the future, a composite fuel was modeled for both the base line and the projects. The composite calculations included HHV, cost, and effects on boiler efficiency.

General Observations of Potential Opportunities:

The costs and fuel consumption rates for 2005 were NOT used as the base-line costs due to the non-representative nature of the post-Katrina price run-up. Baseline fuel costs are derived from already committed fuel purchases and corporate / plant pricing assumptions. Natural Gas is estimated at an annual average of $8.00 / mmBtu and #6 fuel oil at $1.00 per gallon.

Base Line fuel:

#6 Fuel Oil		
Natural Gas		

Electrical costs / use were not impacted.

<u>Energy Savings Opportunities – Near Term</u> (see definitions below):

Project #1 – Recover Process Waste Heat

A significant quantity of condensate is unsuitable for return to the boiler system due to unavoidable process contamination. This condensate is diverted to waste in a “hotwell” which is cooled via a cooling tower, and used as cooling for various other plant process services.

Recovery of this heat by a heat exchanger in the cooling tower "hot" leg will increase make-up water temperature from approximately 50 Deg F to 100 Deg F. The reduction in deaerating steam, and thus boiler duty, will result in savings of approximately $117,000 annually. A heat exchanger that may be suitable for such use is currently available. The wide range of expected implementation costs represents the possibility that modifications / repairs may be required prior to placing the heat exchanger in service.

Project #2 – Revise Operating Practices

Currently the facility operates 3 boilers at reduced capacity for redundancy / reliability reasons. At the time of the ESA, #5 boiler was running on #6 oil with #2 and #3 operating on natural gas. (No. 4 boiler has been removed.) An analysis of reliability indicates that operation of only one of the smaller boilers is required.

Boilers #2 and #5 were operating with high excess O2.

All boilers were operating with FD fan inlet temperatures of 85 Deg F due either to suction location or HVAC influences.

The following measures are recommended:

- Operate #5 boiler at a higher load in combination with only one of the other, smaller boilers.
- "Tune" all boilers to reduce excess O2 levels to be consistent with the newly upgraded control systems' capabilities
- Relocate #5 boiler FD fan inlet to the ceiling of the boiler room, redirect HVAC outlets away from #1, #2, and #3 boiler FD fan inlets. The resulting increase in "ambient" temperature will increase boiler efficiencies by approximately 0.5% each.

The combined effect of these measures will result in a 90% oil / 10% natural gas fuel mix, increased boiler efficiency, and savings of approximately $538,000 dollars annually.

Project #3 – Insulate Process Equipment

Currently, a significant number of process units are partially uninsulated. The resulting heat loss is equivalent to 5.1 kLb/hr of steam. Insulating these units will result in an annual savings of approximately $402,000. A discussion with an attendee from a similar Goodyear facility and a review of corporate communications indicates that this recommendation can be applied to other company facilities. Implementation costs are estimated to be between $80,000 and $200,000 at the Union City facility.

Energy Savings Opportunities – Medium Term Not Applicable

Energy Savings Opportunities – Long Term Not Applicable

- Near term opportunities would include actions that could be taken as improvements in operating practices, maintenance of equipment or relatively low cost actions or equipment purchases.
- Medium term opportunities would require purchase of additional equipment and/or changes in the system such as addition of recuperative air preheaters and use of energy to substitute current practices of steam use etc. It would be necessary to carryout further engineering and return on investment analysis.
- Long term opportunities would require testing of new technology and confirmation of performance of these technologies under the plant operating conditions with economic justification to meet the corporate investment criteria.

Natural Gas Savings

Time Horizon	% Natural Gas Savings (mmBtu Basis)
Near Term	77.5%
Medium Term	N/A
Long Term	N/A

Management Support and Comments:

Facility management is fully supportive of the ESA efforts and provided all the data and access required by the ESA scope.. The Goodyear, Union City plant manager was key to Goodyear's corporate involvement in the DOE ESA process.

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